

科目：無機化學 適用：應化所

編號：443

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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1. 簡答題 (共 40 分，填充題限用英文作答)：

- (a). VSEPR stands for _____. 【5 分】
- (b). HOMO stands for _____. 【4 分】
- (c). LFSE stands for _____. 【4 分】
- (d). Explain Pauli exclusion principle. 【3 分】
- (e). Explain Hund's rules. 【3 分】
- (f). The lowest energy state of an atom, an ion or a molecule is called the _____ state. 【1 分】
- (g). Bohr radius = _____ pm. 【1 分】
- (h). " $h = ET = p\lambda$ " is known as _____ principle. 【2 分】
- (i). How many nodal planes can be found in σ , π and δ bonds? 【3 分】
- (j). _____ theorem predicts that distortion will occur whenever the resulting splitting of energy levels yields additional stabilization. 【2 分】
- (k). _____ selection rule states that transitions may occur only between energy states with the same spin multiplicity. 【1 分】
- (l). _____ rule states that transitions can occur only between states of opposite parity in centrosymmetric environments. This rule can be relaxed via _____ coupling mechanism. 【2 分】
- (m). Optical rotation and circular dichroism together are known as the _____ effect. 【1 分】
- (n). When a low-valent transition-metal complex reacts with another compound to yield a product in which both the oxidation number and coordination number of the metals are increased, the reactions are known as _____. The reverse of the reactions is known as _____. 【4 分】
- (o). " $C + H_2O_{(g)} \rightarrow CO + H_2$ " is known as the _____ reaction. 【2 分】
- (p). What metal is believed to binds to O_2 in hemoglobin? 【1 分】
- (q). The prosthetic group in hemoglobin is _____. 【1 分】

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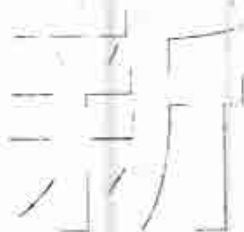
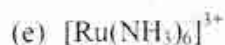
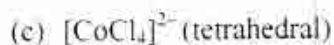
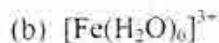
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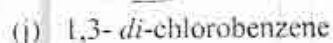
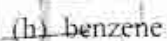
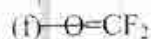
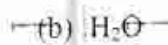
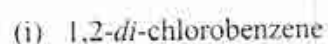
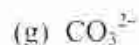
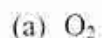
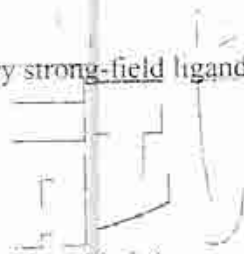
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2. Determine the LFSE for each of the following (20 分，各 4 分)：



3. What is the point group of each compound below (20 分，各 2 分)：

4. Explain why CO and CN^- are very strong-field ligands (10 分)。5. 試由 NH_3 導出 C_{3v} 的 character table (10 分)。